UNIVERSITY OF KOTA

FACULTY OF SCIENCE

SYLLABUS

M.Sc. (Wildlife Science)

Examination- 2012-13

M.Sc. (Wildlife Science) Exam – 2012-13

Eligibility: B.Sc. (under 10+2+3 scheme) with Botany/ Zoology/Agriculture/ Biotechnology/ Biochemistry /Microbiology/ Forestry/Nursing and Veterinary Science/equivalent graduate with science background from any University recognized by UGC with 50% marks.

(45% for candidates belonging to the reserved category SC/ST/OBC/SOBC)

Scheme of Examination and Courses of study

1. The numbers of paper and maximum marks for each theory paper/practical have been shown in the syllabus. It will be necessary for a candidate to pass in the theory part as well as in the practical part (wherever prescribed) separately.
2. The course of study for M.Sc. (Wildlife Science) examination shall spread over a period of four Semesters with written examination at the end of each semester, except IV semester where in he/she will be submitting a Project report/dissertation)
3. Syllabus of each first three semester will be divided into 5 units.
4. Scheme of examination-

M.Sc. Semester I - Wildlife science

Paper Code	Nomenclature of the Paper	Max. Marks	Min. Marks
WLS-01	Biogeography, Ecology, Animal and Vegetation Science	**100 (70+30)**	**36 (25+11)**
WLS-02	Biology of Indian Wildlife	**100 (70+30)**	**36 (25+11)**
WLS-03	Population Ecology and Statistical Methods	**100 (70+30)**	**36 (25+11)**
WLS-04	Illegal Trade of Wildlife	**100(70+30)**	**36 (25+11)**
WLS-05	Laboratory and Computer Practical-**I**	**75**	**27**
WLS-06	Field Practical-I	**75**	**27**

M.Sc. Semester II - Wildlife science

Paper Code	Nomenclature of the Paper	Max.Marks	Min. Marks
WLS-07	Habitat Ecology	**100 (70+30)**	**36 (25+11)**
WLS-08	Wildlife Ecology and Conservation Biology	**100 (70+30)**	**36 (25+11)**
WLS-09	Wildlife Health	**100 (70+30)**	**36 (25+11)**
WLS-10	Environment Impact Assessment (EIA)	**100 (70+30)**	**36 (25+11)**
WLS-11	Laboratory and Computer Practical-II	**75**	**27**
WLS-12	Field Practical-II	**75**	**27**

5. There will be four papers in theory, each of three hours duration, 70 mark each (External assessment), Internal Assessment of 30 marks (One hour duration) and two practical carrying 75 marks each. (10 marks are reserved for record, 10 for viva, 10 for project, 10 marks for one seminar in each examination and remaining 35 marks constitute Major and Minor questions).

6. A candidate for a pass at each of the semester examination shall be required to obtain (i) at least 45% marks in the aggregate of all the papers prescribed for the examination and (ii) at least 45% marks in practical wherever prescribed at the examination, provided that if a candidate fails to secure at least 36% marks in each individual paper at the examination and also in the Test/ Dissertation/ Survey Report/ Field works, wherever prescribed, he shall be deemed to have failed at the examination not withstanding his having obtained the minimum percentage of marks required in the aggregate for that examination.

No division will be awarded at the previous Examination. Division shall be awarded at the end of the final Examination on the combined marks obtained in all the semester Examinations taken together, as noted below

First division with distinction – 75% on the aggregate marks

First Division – 60% of the aggregate marks and

Second Division – 48% in all semesters.

Pass – upto 45%

7. If a candidate clears any paper(s) prescribed at the Semester Examination after a continuous period of two years, then for the purpose of working out his division the minimum pass marks only viz. 36% (45% in the case of practical) shall be taken into account in respect of such papers(s)/ Practical(s) are cleared after the expiry of the aforesaid period of three years; provided that in case to reach the minimum aggregate as many marks out of those actually secured by him will be taken into account as would enable him/her to make up the deficiency in the requisite minimum aggregate.

8. A total of twelve theory papers (3 hours duration each) are prescribed in (4 in each semester). A combined practical Examination (10 hrs. duration two days) shall be conducted in each semester.

9. The pattern of examination will be similar as adopted in other. P.G. exams of university of Kota along with by means of dissertations / Project Report / Seminar as prescribed in the syllabus.

10. Pattern of Q. Paper will follow the adopted scheme i.e. the Q.P. will be divided in three sections A,B, & C. Section 'A" Will contain 10 short answer type questions and all will be compulsory. Section 'B' will contain 10 questions, 2 from each unit. Candidate will be required to attempt 5 questions selecting 1 from each unit. Section 'C' will contain 4 question set from different units. Candidate will be required to attempt any 2 questions.

11. A candidate may be promoted to III semester if he/she secures at least 36% marks in at least seven out of ten papers (8 theory papers + 2 practical's) prescribed at the I and II semester taken together provided that the aggregate marks in all theory papers of I and II semester taken together is at least 45%. Such candidate shall be required to appear in theory papers in which he/she has secured less than 36% marks of I and II semester along with the theory papers of III and IV (Project) semester respectively, as and when such examinations are held.

12. A candidate may be promoted to second year if he/she has secured at least 36% marks in each theory paper but has failed to secure 45% marks in aggregate (theory and practical separately). He shall be required to appear in some theory papers of I and II semester so as to make his aggregate at least 45% along with III and IV (Project) semester, whenever examination of these courses are held.

13. A candidate may be allowed grace marks at maximum two places up to the extent of 1% of the total marks prescribed for that examination.

Note-: Each Theory Paper –

External Assessment of 70 Maximum Marks (25 Minimum Marks)

Internal Assessment of 30 Maximum Marks (11 Minimum Marks)

M.Sc. Wildlife Sc. Semester-I 2012-13

Paper – WLS - 01

Biogeography, Ecology, Animal and Vegetation Science

Min Pass Marks-25 Duration- 3 hrs MM - 70 marks

Note : The question paper will contain three sections as under –

Section A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part. Total Marks : 10

Section B : 10 question, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words. Total Marks : 30

Section C : 4 questions (question may have sub division) covering all units descriptive type, answer in about 500 words, 2 questions to be attempted. Total Marks : 30

Unit - I

Biogeography

Bio-geographical realms and provinces, Neartic, Paleartic, Ethiopian, Neotropical, Australian and Oriental fauna. The origin of Indian fauna and flora and routes of faunal exchange and migration. Zoogeography of Indian mammals. Biogeography of India.

Unit - II

Fundamentals in Ecology

Communities, populations, groups and individuals. Functioning of ecosystem: energy flow and nutrient cycles, the establishment of trophic equilibrium; biogeochemical cycles. The concept of a system approach to ecological functioning. Ecosystem services: pollination, seed dispersal, insect and pest control. Population ecology, inter and intra-

specific competition and mutualism. Density dependence-optimum foraging theory, carrying capacity. Corridors, eco-sensitive zones, tiger critical habitat.

Unit- III

General Silviculture

Silviculture- General principles, ecological and physiological factors influencing vegetation, natural and artificial regeneration of forest. Habitat improvement. Limiting factors and their role. Umbrella species, key stone species, Indicator species

Unit - IV

Introduction to Forest types

The major Forest types of India; structure, composition and function. Champion & Seth's classification of Indian Forest. Major Forest types of Rajasthan. Vegetation quantification: field sampling, mapping structural, ecological and floristic associations. Storeyfication in Forest area, Canopy density.

Unit- V

Introduction to Biological Diversity

Concept of Biodiversity, level of biodiversity, biological, genetic, species and ecosystem diversity. Indigenous and introduce species, alpha, beta, gamma diversity. Faunal diversity and biogeographic distribution of India. Animal conservation issues and strategies.

Practicals

Study of alpha diversity of Ramgarh Vishdhari wildlife sanctuary, Beta study of Shergarh and Darrah Wildlife Sanctuary. Study of French Institute's maps; Botanical excursions to Ranthambhor National Park or any other sanctuary/ National Park (Orientation tour); Qualification of vegetation sampling methods (Techniques tours). Forest Mensuration exercise. Determination of species, Dominance and frequency using quadrate/ plot method.

Paper – WLS - 02

Biology of Indian Wildlife

Min Pass Marks-25 Duration- 3 hrs MM - 70 marks

Note : The question paper will contain three sections as under –

Section A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part. Total Marks : 10

Section B : 10 question, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words. Total Marks : 30

Section C : 4 questions (question may have sub division) covering all units descriptive type, answer in about 500 words, 2 questions to be attempted. Total Marks : 30

Unit - I

Mammalogy

Zoo-geography of mammals, zoo-geographic regions, continental drift and zoo-geography of India mammals. Adaption in mammals hibernation, torpor, aestivation, locomotion and water regulation. Metabolism and thermoregulation; Ectothermy, homeothermy and cold stress, body size versus homeothermy. Influence of body size on life history, metabolic rate, weight constraints, feeding behavior, niche and reproduction. Skin and its derivatives. Behavior and social organization in mammals; social patterns, mating system, territories; hierarchies, predatory behavior and communications. Impact of religious feeding to animals.

Unit - II

Ornithology and Indian Birds

History of Ornithology in Rajasthan. Review of Indian birds: Taxonomy, general natural history, literature. Biogeography patterns in India avifauna and their affinities. Emphasis on Forest/ Grassland/ Desert/ Aquatic/ Cultivation. Sexual selection in birds. Economic ornithology.

Bird migration: Migratory flyways, threats to migrant populations. Avian community ecology and habitat selection. Endangered and threatened birds; waterfowls: Black-necked Stork, bustards: Great Indian Bustard, floricans, crane: Siberian and Sarus, raptors/Vulture (Gyps genus). Bird census techniques, conservation of bird habitats. Avian extinctions past and present. Important Bird Areas (i.e. IBA) of Rajasthan.

Unit - III

Herpetology

Fresh water and marine turtles, crocodilians, lizards and snakes. Trampling, Zoo-phobia, etc,. Thermoregulation, its role, aestivation, Hibernation and other eco-physiological adaptations. Herpato-phobia and Public Awareness. Role of temperature in sex

determination in reptiles. Management of natural crocodilian egg laying region of Chambal Zone. An overview of conservation problems of Herpatofauna. Snake bites, Venom, Anti-venom, First Aid and Management of snake bite cases.

Unit- IV

Ichthyology

Fresh, brackish and marine water fishes and their adaptation. Threats to fish biodiversity: Threatened fishes of India. Conservation status of fish fauna in India. Methods for fish ecological studies. Exotic fishes, Major carps, Role of fishes in conservation of fishes, gharials, crocodiles, chelonians, otter, etc. Limnology of freshwater.

Unit - V

Forest Entomology

Introduction to Entomology: economic importance, ecological roles, adaptations, Insects as indicators for biodiversity monitoring. Insect fauna in prominent Indian PAs. Entomology of Teak forest. Role of insect conservation of wild animals: sloth bear, pangolin, birds, hedgehog and reptiles.

Practicals

Zoogeography of mammals of Indian sub-continent; Distribution of (i) Primates: Rhesus macaque (ii) Carnivores: Tiger, panther, hyena, sloth bear (iii) Ungulates: Sambar, chital, wild boar.

Study and identification of fish and insects commonly used in any study area.

Horn/ Antler identification. Pugmark analysis. Fake skin identification. Visit to Zoo, Darrah sanctuary, Abheda, Umedganj Pakshi vihar, Udpuria, Vulture roost site and Dump station.

Paper – WLS - 03

Population Ecology and Statistical Methods

Min Pass Marks-25 Duration- 3 hrs MM - 70 marks

Note : The question paper will contain three sections as under –

Section A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part. Total Marks : 10

Section B : 10 question, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words. Total Marks : 30

Section C : 4 questions (question may have sub division) covering all units descriptive type, answer in about 500 words, 2 questions to be attempted. Total Marks : 30

Unit - I

Policy and Legislation

Conservation projects in India: International conservation bodies; IUCN UNDP, FAO, WWF, Conservation of wetlands.

Conservation laws, National wildlife conservation policy and action plan, National forest policy, wildlife (protection) act 1972, International conventions.

Unit - II

Concepts of Conservation

Concept of conservation with special reference to wildlife management and the management of forests in India. Conservation and sustainable development. Conservation versus preservation, Importance of wildlife.

Unit - III

Population Ecology

r & k selection, allometry, aging and sexing, Carrying, capacity, population estimation methods: relative, absolute measures and age/sex composites.

Preparation of sampling designs for population estimation. Analysis of census data. (Studies of various populations and use of census techniques will be carried out as part of field exercises)

Unit - IV

Quantitative Methods- I

Test of significance: Null hypothesis, student t-test, chi-square test.

Unit - V

Quantitative Methods-II

Hypothesis testing, analysis of variance. Regression and correlation. Use of statistical softwares (SPSS).

Practicals

Preparation of a wildlife case to prosecute in the court of Law.

Sampling/ Survey methods

Evaluation of Management Plans of Ramgarh/ Shergarh and Darrah Sanctuary.

Evaluation of Working Plan of Kota/ Baran/ Jhalawar/ Bundi Division.

Preparation of Micro-plan

Paper – WLS - 04

Illegal Trade of Wildlife

Min Pass Marks-25 Duration- 3 hrs MM - 70 marks

Note : The question paper will contain three sections as under –

Section A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part. Total Marks : 10

Section B : 10 question, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words. Total Marks : 30

Section C : 4 questions (question may have sub division) covering all units descriptive type, answer in about 500 words, 2 questions to be attempted. Total Marks : 30

Unit - I

Illegal Trade of Important Indian Fauna

About TRAFFIC and Wildlife trade, Key agencies contributing to wildlife crime enforcement. Some methods of poaching in India, Illegal wildlife trade of some important species and products.

Unit - II

Illegal Trade of Important Indian Flora

Important Medicinal Plants of Arid and Semi-arid zone. CITES listed species Medicinal Plant Conservation Areas (MPCA) in Rajasthan.

Unit - III

Forensic aspects and legal aspects

Prevention of wildlife Offences: Identifying early warning signs, post mortem, weapons of crime, intelligence gathering, maintaining a criminal profile directory, conducting interrogation, securing electronic evidence, some modes of concealment of illegal wildlife products.

Unit - IV

Wildlife Toxicology-I

Exposure of wildlife to toxicants in natural habitats and manmade habitats. Metals and their exposure. Toxicity testing of wildlife exposure to toxicants. Effect of Radiations on wildlife.

Unit - V

Wildlife Toxicology-II

Various toxicological testing methods. Biological indicators of pollution exposures. Biomagnification of pesticides and heavy metals, consequences of biomagnifications.

Practicals

Wildlife forensic: Collection of samples, Sample collection kit and chain of custody. Visit to post-mortem sites. Identification of fake skin/wildlife materials. Identification of weapons.

Practicals

Min Pass Marks-54 Duration- 5 hrs MM - 150 marks

WLS-05 Laboratory and Computer Practical-I MM - 75

WLS-06 Field Practical-I MM- 75

Field Tour

Orientation Tour 2 weeks

Techniques Tour-I 4 weeks

M.Sc. Semester II - Wildlife Science (2012-13)

Paper Code	Nomenclature of the Paper	Max.Marks	Min. Marks
WLS-07	Habitat Ecology	100 (70+30)	36(25+11)
WLS-08	Wildlife Ecology and Conservation Biology	100 (70+30)	36(25+11)
WLS-09	Wildlife Health	100 (70+30)	36(25+11)
WLS-10	Environment Impact Assessment (EIA)	100 (70+30)	36(25+11)
WLS-11	Laboratory and Computer Practical-II	75	27
WLS-12	Field Practical-II	75	27

Paper-WLS-07

Habitat Ecology

Min Pass Marks-25 Duration- 3 hrs MM - 70 marks

Note : The question paper will contain three sections as under –

Section A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part. Total Marks : 10

Section B : 10 question, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words. Total Marks : 30

Section C : 4 questions (question may have sub division) covering all units descriptive type, answer in about 500 words, 2 questions to be attempted. Total Marks : 30

Unit I

Introduction to habitat ecology: Ecology of major habitats: Deserts, grasslands, Wetlands & forests.

Physical and anthropogenic factors influencing terrestrial habitats: Drought, flood, grazing, felling, fire. Habitat degradation and fragmentation.

Practical: Field visits for habitat evolution, visit to wetland areas. Wetland habitat (Ghana National Park/ Jhil Mil Tal wetland)

Unit II

Measuring wildlife habitats: Utilization of habitat by wild animals. Cover classification and mapping, Inventory of unique habitats like deserts. Use of photographic records for habitat monitoring.

Unit III

Animals' signs as indicators of use patterns: Animal signs: dig, scratch marks, pugmarks, kills, dragging sign, beat path, slips, rolling, browse and graze marks. Use and availability of habitat resources. Development of predictive models.

Unit IV

Application of Remote sensing in wildlife management: Principals and practical applications of remote sensing techniques, including aerial photography and satellite imagery. Use of photographs as maps and in map preparation. Interpretation of photography and imagery.

Unit V

GIS Techniques: *Geographical information systems:* Applications in wildlife. Use and imagery for quantitative analysis. Stereoscopy. Preparation of maps and field orientation. Introduction to computerized techniques.

Practical: Comparison of several techniques for quantitative habitat survey and mapping. Evaluating habitat availability and utilization. Visit to GIS Laboratory.

Paper-WLS-08

Wildlife Ecology & Conservation Biology

Min Pass Marks-25 Duration- 3 hrs MM - 70 marks

Note : The question paper will contain three sections as under –

Section A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part. Total Marks : 10

Section B : 10 question, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words. Total Marks : 30

Section C : 4 questions (question may have sub division) covering all units descriptive type, answer in about 500 words, 2 questions to be attempted. Total Marks : 30

Unit I

Behavioral Ecology

Behavioral ecology and evolution: Optimal foraging theory and other models. Prey predator relationships and evolutionary arms races. Competition for resources: ideal free distributions and resource defense. Group living: costs, benefits and optimal group size theory, fights, contests and assessment.

Cooperation and helping : Mammals, birds fishes. Ecology and evolution of signals and communication pathways. Behavioral patterns in captivity.

Unit II

Community Ecology

Definitions and nature of communities; Community structure organization and stability (guilds, resource partitioning, niche, competitive exclusion).

Unit III

Conservation Biology

Conservation of biodiversity : Patterns and processes intra specific diversity, species richness, richness of higher taxa, ecosystem and biome diversity, patterns of losses; loss of biodiversity, causes and factors of mass extinctions and critical hot spots conservation of rage species, long lived species. Tiger reintroduction in Sariska, role of Ex-situ conservation, role of zoos and aquariums, introduction, rehabilitation of wild animals and translocation. PA network (National parks, Sanctuary, reserves, Community reserve, Biosphere reserves.)

Unit IV

Wildlife Genetics

Loss of genetic variation, genetically effective population size, demographic bottleneck and inbreeding depression. Management and conservation of genetic variation in natural population, conservation breeding, gene bank.

Unit V

Landscape Planning

Landscape as an environmental asset, techniques of landscape assessment at different levels, use of landscape design for environmental improvement. Eco-friendly Buildings. Landscape designing in zoos, zoo forestry.

Practicals

Methods of behavioral observation; Instantaneous scan, focal animal, all occurrence and one-zero sampling, collection and analysis of behavioral data of some common availability species, preparation of ethograms, time-activity budgets and social interaction matrices; demonstration of radio-telemetry methods of study activity patterns (if feasible)

Seminar based discussion and paper analysis and criticism. Calculations of energy and productivity. Analysis of species diversity.

Seminar and project/case study. Preparation of report on landscape planning of Kota zoo, preparation of report on eco-tourism zone of Darrah Sanctuary/ Shergarh Wildlife Sanctuary/ Ramgarh Vishdhary WLS.

Paper-WLS-09
Wildlife Health

Min Pass Marks-25 Duration- 3 hrs MM - 70 marks

Note : The question paper will contain three sections as under –

Section A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part. Total Marks : 10

Section B : 10 question, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words. Total Marks : 30

Section C : 4 questions (question may have sub division) covering all units descriptive type, answer in about 500 words, 2 questions to be attempted. Total Marks : 30

Unit I

Wildlife Health

Review of major diseases of Indian wild mammals, birds, amphibians and reptiles. Epidemiology of disease. Disease transmission, between domestic and wild populations. Malnutrition, starvations, dehydration as disease syndromes. Control of disease, planning and management of wildlife health programmes.

Unit II

Common disease in Indian Wildlife

Parasitic Infections of Fish, Parasites of Reptiles Recommended Treatments for Diseases of waterfowl and Game Birds, FPL in big cats, Rabies in Sloth Bear, TB in Spotted Deer,

Hanuman Langur, Lymphoid leucosis – Peafowl, Haemangioma & Paragonimus infection – Tiger, Ascending Duodenal Invagination – Leopard, Sarcocystois - Barasingha, Gasthrothylax - Swamp Deer, Pasteurellosis infection – Elephant.

Unit III

Diseases: Source and management

Role of Wildlife in Parasitic Diseases of Man and animal, Wildlife Health Management in India, Insects and Disease Relationship in Man and Wildlife, Wildlife diseases of Vertebrates of Rajasthan. Importance of Wildlife Diseases and their control.

Unit IV

Capture & Handling of Wild Animals-I

Capture and handling of animals : Restraints, Capture and Animals Barriers : Purpose, live traps, snares, pits, nets, canon (rocket) nets, net gun, mist nets, corrals, stockade, spotlighting. Animal barriers : Reasons for use; trenches, walls, stockades, mechanical fences, electric, repellents.

Drug immobilization : Jabstick, blowpipe, pistol, rifle, crossbow, dart design; radio darts. Drug action, dosages, responses, side effects, effects, safety measures, complications, blind folding.

Unit V

Capture & Handling of Wild Animals-II

Handling and transport design of sledge, crate and holding enclosures. *Individuals identification and location :* Purposes, identification by natural marking, individual damage, passive marking collars, tags, branding, rings etc. Dynamic marking-beta light, radio tracking- harnesses, collars; tele- metering of physiological parameters etc.

Practicals : Demonstration of equipment traps, net, dart gun etc. Mist netting and trapping on campus. Participation in capture operations as appropriate. Examination of various types of barrier in the field. Field identification by natural markings. Equipment and its use tags, collars, radio tracking equipment. Bird ringing.
Identifying common parasites- protozoan, helminthes, insects, ticks and vectors.

Paper-WLS-10
Environment Impact Assessment (EIA)

Min Pass Marks-25 Duration- 3 hrs MM - 70 marks

Note : The question paper will contain three sections as under –

Section A : One compulsory question with 10 parts, having 2 parts from each unit, short answer in 20 words for each part. Total Marks : 10

Section B : 10 question, 2 questions from each unit, 5 questions to be attempted, taking one from each unit, answer approximately in 250 words. Total Marks : 30

Section C : 4 questions (question may have sub division) covering all units descriptive type, answer in about 500 words, 2 questions to be attempted. Total Marks : 30

Unit I
Procedures of EIA in Developed & Developing Countries

Introduction to Environmental Impact Assessment (EIA), Environmental Impact Analysis, Social Impact Assessment (SIA, Strategies Environmental Assessment (SEA), Environment Impact statement (EIS), Environmental Audits, definition of other useful terms in EIA Scope and purpose of EIA. Current status of EIA in India. EIA Procedures, introduction to administrative and technical requirements, procedural steps in EIA-scoping, screening. Baseline study formats, determination of impact significance criteria.

Unit II
Environmental Design

Design as a determinant of Environmental quality. Evolution of Environmental design, theories and practices of design. Criteria of Urban Environmental design issues-pedestrian-vehicular conflict. Environment, Housing areas, dereliction, environmental upgradation programmes. Urban climatology, effects of thermal pollution, factors causing heat sink effects, direct radiation, climatic effects on Urban areas, control techniques.
Environmental Mitigation planning, Principal and practices, mitigatory approaches and feasibility analysis. Environmental Auditing and Monitoring Concepts, objectives and usefulness. Environmental Economics. Introduction to some recent approaches in environmental economics for determination of monetary values of environmental goods and services.

Unit III
Environmental Impact Assessment

Role of EIA in the Planning and decision making process. Methods of EIA; advantages and limitations. Assessment of impacts on resources (Including air, water, flora and

fauna). Assessment of impacts on Land use. Public Participation in EIA;definition and concepts, objectives, techniques, advantages and limitation, PRA techniques. Impacts of Development Projects on Flora. Impacts of Development Projects on Fauna.

Unit IV

Environmental Legislation, Evolution and Practices

Environmental Legislations and Regulations: Salient features of important environmental legislation, statutory obligations, environmental clearance procedures and GOI requirements. EP Act 1986. Air (Prevention and Control of pollution) Act. Water (Prevention and control of pollution) Act. Mines and Mineral Act. Factories Act. Pesticides Act. Indian Forest Act. Wildlife Act. Ancient Monuments and Archaeological Sites and Remains Act. Hazardous Waste Management and Handling Rules / Biomedical Rules / Solid Waste. Management Rules. Environment Tribunal Act. Climate change Protocols and Conventions. MOEF Guidelines and Notifications. Appellate Authority Act.

Unit V

Environmental Monitoring Assessment

Air Pollution- emission sources, vehicular emissions, techniques of monitoring of emissions, emission standards, and ambient air quality. Concepts of relevant meteorological parameters, and interpolation of data, wind system measurement, turbulence; mixing height, plume use, dispersion and dispersion models. Water Pollution – sources, water quality tests, minimum standards of disposal (for different uses), performance criteria. Noise Pollution- sources, techniques of measurement, noise level standards. Land Pollution -sources, soil erodibility tests, minimum standards of disposal (minimum standards for different uses), performance criteria.

Practical

Environmental Impact Assessment Report: Guidelines for developing formats for preparing and reviewing EIA reports and Environmental Management Plans, Case Studies.

Familiarisation with relevant instruments/equipments and procedures (High Volume Sampler, Handy Sampler, Noise Meter, Spectrophotometer etc), TSPM, RSPM, SO2, NOX, Stack Monitoring, Noise Level Measurements etc.

Water Quality Parameters

Familiarisation with relevant instruments/equipments and procedures (Flame Photometer, Water Testing Kit, Digital pH meter, BOD Incubator, Dissolved Oxygen Meter)

Alkalinity, Amonical Nitrogen, BOD, COD, DO, Coliform, Fluoride, Nitrate-Nitrogen, pH, SAR, etc.

Soil Quality Parameters

Familiarisation with relevant instruments/equipments and procedures (Soil Testing Kit)
pH, EC, Soil Moisture, Phosphate, Potassium, Sodium, etc.

Weather Parameters

Familiarisation with relevant instruments/equipments and procedures (Electronic Weather Station)
Temperature, Relative Humidity, Rainfall, Wind Direction and Speed, etc.

Practical

Min Pass Marks-54 Duration- 5 hrs MM - 150 marks

WLS-11	Laboratory and Computer Practical-II	MM: 75
WLS-12	Field Practical-II	MM: 75

Field Tours

Techniques Tour-II	2 weeks
Specialized Techniques Tour/ Workshop on Photography	2 weeks

Field Tour

Orientation Tour 2 weeks

Techniques Tour-I 4 weeks